

ECC BOLTS - 1



$$V_{DIR} = 100^k / 4 = 25^k$$

Solve V_{MOMENT}

$$M = 100^k \times 6'' = 600 \text{ k-in}$$

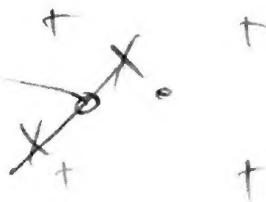
d FROM CG TO BOLT

$$d = 1.5'' \times \sqrt{2}$$

$$d = 2.12''$$

$$\sum d^2 = 4 \times (2.12'')^2$$

$$\sum d^2 = 18$$



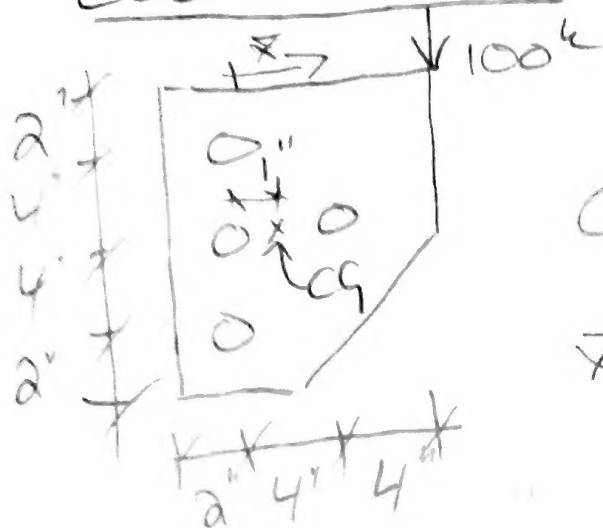
$$V_{HORIZ} = 0 + \frac{600 \times 1.5''}{18} = 50^k$$

$$V_{VERT} = V_{DIR} + \frac{M \times h}{\sum d^2}$$

$$= 25^k + \frac{600 \times 1.5}{18} = 75^k \text{ OR } 25^k$$

$$V_{TOT} = \sqrt{50^2 + 75^2} = 90^k$$

ECC BOLTS 2



$$CG: \bar{y} = 6'' \text{ BY INSPECTION}$$

$$\bar{x} \Rightarrow \frac{3 \cdot 0'' + 1 \cdot 4''}{4} = 1''$$

$$\text{ECCENTRICITY} = 100^k \times (4'' + 4'' - 1'') = 700^k \cdot \text{in}$$

$$V_{DIR} = 100^k / 4 = 25^k$$

$$\Sigma d^2 = 1^2 + 3^2 + (\sqrt{17})^2 + (\sqrt{17})^2 = 44$$

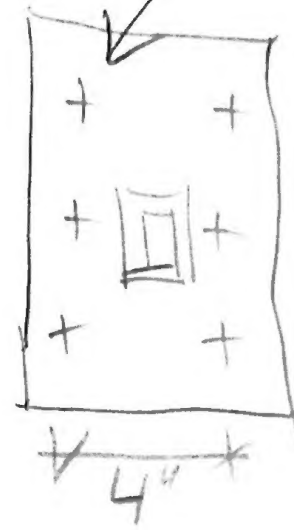
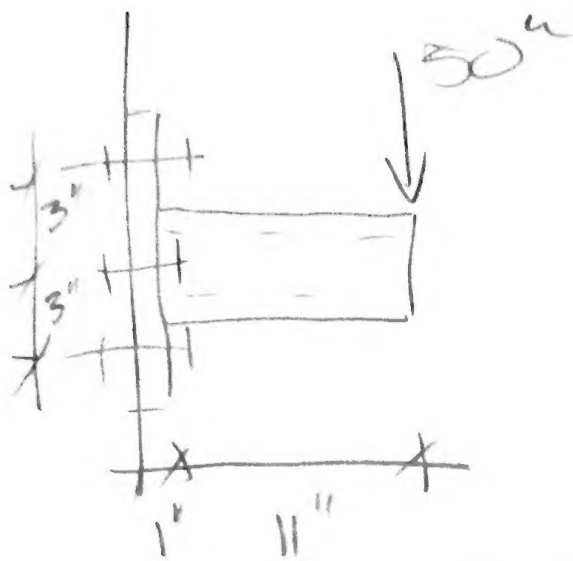
$$\begin{aligned} \text{T/B BOLT} \\ d &= \sqrt{1^2 + 4^2} \\ &= \sqrt{17} \end{aligned}$$

$$V_{HORIZ \text{ TOP BOLT}} = \frac{700 \times 4}{44} = 64^k$$

$$\begin{aligned} V_{VERT \text{ TOP BOLT}} &= 25^k + \frac{M \times h}{\Sigma d^2} \\ &= 25 + \frac{700 \times 1}{44} = 41^k \end{aligned}$$

$$V_{TOT} = \sqrt{64^2 + 41^2} = 76^k$$

ECC-BOLTS 3



$$M = 50^k \times 12'' = 600 \text{ k-in}$$

$$V_{DIE} = 50^k / 6 = 8.3^k \text{ SHEAR}$$

$$T/C = 600 \text{ k-in} / 6'' \times 2 \text{ BOLTS} = 50^k \text{ TOR}$$

$$1.3 F_{nt} - \frac{F_{nt} f_{rv}}{\phi F_{nv}} < F_{nt}$$

$$1.3 \times 90 - \frac{90}{0.75 \times 34} \times \left(\frac{8.3}{0.2} \right) = 24 \text{ ksi}$$

$$24 \text{ ksi} \times 0.9 \times 0.0007 = 4.47^k \text{ NG!}$$